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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,425	08/15/2001	Ramesh Raskar	CR-1347	1545

7590

07/23/2003

Patent Department
Mitsubishi Electric Research Laboratories, Inc.
201 Broadway
Cambridge, MA 02139

EXAMINER

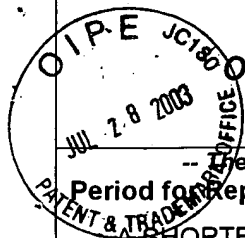
KOVAL, MELISSA J

ART UNIT	PAPER NUMBER
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2851

DATE MAILED: 07/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.



Office Action Summary

Application No.	Applicant(s)	
09/930,425	RASKAR, RAMESH	
Examiner	Art Unit	
Melissa J Koval	2851	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☒ Claim(s) 8 and 9 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 08/01.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

The abstract of the disclosure is objected to because The word -- concurrently -- is incorrectly spelled "concurrretnly" in the second to last line of the abstract. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6, 8 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The language of claim 6 is not clear as it cannot be understood if the rectangular display area is larger than the claimed polygon, or if the polygon extends outside the rectangular display screen area.

With respect to claim 8, the phrase "maximum likelihood estimation problem" requires further description to make clear how the problem is defined and calculated.

With respect to claim 9, H_j and H_i are set forth, but it is not clear which represents the first homography and which represents the second homography. Claim 8 defines H as the first homography and claim 9 defines H as the second homography, without any further distinction set forth both claims are vague and indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Surati et al.

Refer to Figure 1 of Surati et al.

Claim 1 sets forth: "A method for forming a mosaic image on a display surface with a plurality of projectors, comprising:

projecting, for each projector in turn, a registration image onto the display surface so that a union of the projected registration images forms a polygon (Projectors P1-P4 and their respective images I1-I4 are projected onto screen 11);

acquiring with a camera, for each registration image in turn, a corresponding input image (refer to camera 17. refer to column 8, lines 48-58.);

identifying a display area on the display surface enclosed by the polygon (refer to computer 18 and to column 8, lines 52 through 58.);

determining, for each projector, a single projective matrix between the display area and each input image (refer to figure 4B, and figure 5.);

warping, for each projector, a source image according to the corresponding single projective matrix (refer to figure 4A. See box 311.);

weighting pixels of the warped source image according to the single

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projective matrix (refer to figure 4A. See box 313.); and

concurrently projecting the warped and weighted source images directly onto the display surface to form the mosaic image (refer to display phase 303 of Figure 4A).

With respect to claims 2, 3 and 4, refer to column 8, lines 26 through 36 of Surati et al. The limitations of claim 2 through 4 are met by the teaching therein.

With respect to claim 5, refer to Figure 7 wherein the P_iC mapping shown can accommodate a checkerboard.

Claim 6 is met by Figure 1 of Surati et al. as far as the terms and limitations of claim 6 can be understood.

Claim 7 sets forth: "The method of claim 1 further comprising:
defining, for each projector, a first homography between the camera and the projector (refer to step 33 of Figure 5 wherein projector to camera mapping is established);

defining, for each projector, a second homography between the display area and the camera (refer to step 31 of Figure 4B wherein screen to camera mapping is established); and

combining the first and second homographies to form the single projective matrix (In view of the teachings of Figures 4B and 5, refer to column 11, lines 36 through 42).

Claim 11 sets forth: "A system for forming a mosaic image on a display surface, comprising:

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a plurality of projectors, each projector arranged to project a registration image onto the display surface (screen 11) so that a union of the projected registration images forms a polygon (Projectors P1-P4 and their respective images I1-I4);

a camera arranged to acquiring, for each registration image in turn, a corresponding input image (camera 17. refer to column 8, lines 48-58.);

means for identifying a display area on the display surface enclosed by the Polygon (computer 18. refer to column 8, lines 52 through 58.);

means for determining, for each projector, a single projective matrix between the display area and each input image (refer to figure 4B, and figure 5.) ;

means for warping, for each projector, a source image according to the corresponding single projective matrix (refer to figure 4A. See box 311.);

means for weighting pixels of each warped source image according to the single projective matrix so that projected warped and weighted source images form the mosaic image on the display surface (refer to figure 4A. See box 313.).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Surati et al.

Refer to Figure 6 of Surati et al. Also refer to column 12, lines 40 through 67, and column 13, lines 1 through 40.

Claim 10 sets forth: "The method of claim 1 further comprising:

assigning a zero weight to a particular pixel in each warped image if the particular pixel is outside the display area;

assigning a one weight to the particular pixel if the particular pixel is an only pixel illuminating the display area; and otherwise

assigning a weight W in a range $0 < W < 1$ to the particular pixel, where W is proportional to a distance to a nearest pixel having a zero weight."

Surati et al. do not discuss assigning weight to pixels in exactly the same terms as does the applicant. Surati et al. discuss the concept of x and y coordinate pairs for a list of centroids. Surati et al. discuss pixel values in a range between 0 and 255. Those centroids not contained within the boundary of the largest rectangle within the projected area are eliminated.

Therefore, based on the teaching of Surati et al., the weighting of pixels to screen mapping and display is well known in the art. It would have been obvious to one having ordinary skill in the art at the time the invention was made to weight pixels as desired depending on the display surface and the correction algorithms used. The motivation for one having ordinary skill in the art to limit the range to between zero and one would have to do with the state of the art, utilizing an accurate and simplified process.

Allowable Subject Matter

Claims 8 and 9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.


Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melissa J Koval whose telephone number is (703) 308-4801. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russell Adams can be reached on Monday through Thursday at (703) 308-2847. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

MJK
July 21, 2003


RUSSELL ADAMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

 Notice of References Cited	Application/Control No. 09/930,425	Applicant(s)/Patent Under Reexamination RASKAR, RAMESH	
	Examiner Melissa J Koval	Art Unit 2851	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,456,339 B1	09-2002	Surati et al.	348/745
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



Sheet 1 of 1

Form PTO-1003
(modified 2/99)U.S. DEPT OF COMMERCE
Patent and Trademark OfficeAttorney Docket Number:
CR-1347

Serial Number:

INFORMATION DISCLOSURE CITATION
(Use several sheets if necessary)Applicant:
Ramesh RaskarFiling date:
Herewith

Group art area:

1017 U.S. PTO
09/23/02
08/15/01

U.S. PATENT DOCUMENTS

Examiner Initial	Patent number	Date	Name	Class	Sub-class	Filing date if appropriate
MJK	5,986,668	11/16/99	Szeliski et al.	345	433	345/433

FOREIGN PATENT DOCUMENTS

	Document number	Date	Country	Class	Subclass	Translation	
						YES	NO

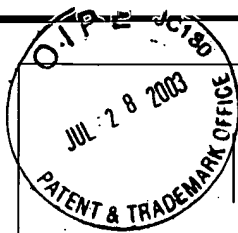
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

MJK	Chen, "QuickTime VR - An Image-Based Approach to Virtual Environment Navigation"; Computer Graphics Proceedings, SIGGRAPH '95, pp. 29-38, 1995.
MJK	Szeliski et al. "Creating Full View Panoramic Image Mosaics and Environment Maps"; Computer Graphics Proceedings, SIGGRAPH '97, pp. 251-258, 1997.
MJK	Raskar et al., "Multi-Projector Displays Using Camera-Based Registration"; Proceedings of IEEE Visualization, pp. 161-168, 1999.
MJK	Chen et al., "Automatic Alignment of High-Resolution Multi-Projector Displays Using an Un-Calibrated Camera"; IEEE Visualization 2000, 2000.

Examiner:

Date Considered:

EXAMINER: Initialed if citation considered, whether or not citation is in conformance with MPEP G609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.



Search Notes



Appli ation No.

09/930,425

Examiner

Melissa J Koval

Applicant(s)

RASKAR, RAMESH

Art Unit

2851

SEARCHED

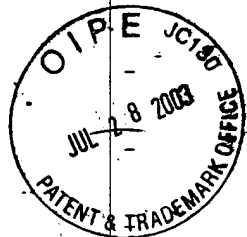
Class	Subclass	Date	Examiner
353	94, 69, 70	7/21/2003	<i>MJK</i> MJK

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
EAST (sheet attached)	7/21/2003	<i>MJK</i> MJK



L Number	Hits	Search Text	DB	Time stamp
-	1007	project\$5 and warp\$5 and pixel\$5 and camera\$1	USPAT; US-PGPUB; EPO; JPO	2003/07/21 14:02
-	11366	353\$5.ccls.	USPAT; US-PGPUB; EPO; JPO	2003/07/19 14:15
-	13	(project\$5 and warp\$5 and pixel\$5 and camera\$1) and 353\$5.ccls.	USPAT; US-PGPUB; EPO; JPO	2003/07/19 14:18
-	44931	348\$5.ccls.	USPAT; US-PGPUB; EPO; JPO	2003/07/19 14:19
-	140	(project\$5 and warp\$5 and pixel\$5 and camera\$1) and 348\$5.ccls.	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:09
-	511	353/94	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:01
-	523	353/69	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:06
-	21	353/69 and warp\$3	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:07
-	268	353/70	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:07
-	4	(project\$5 and warp\$5 and pixel\$5 and camera\$1) and 353/70	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:09
-	531	(project\$5 and warp\$5 and pixel\$5 and camera\$1) and weight\$5	USPAT; US-PGPUB; EPO; JPO	2003/07/19 15:28
-	1	5,986,668.pn.	USPAT; US-PGPUB; EPO; JPO	2003/07/21 14:02



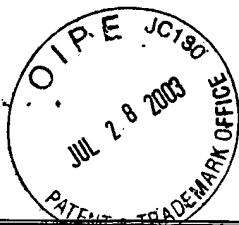
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WASHINGTON, D.C. 20231
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BIBDATASHEET**CONFIRMATION NO. 1545**

Bib Data Sheet

SERIAL NUMBER 09/930,425	FILING DATE 08/15/2001 RULE	CLASS 353	GROUP ART UNIT 2851	ATTORNEY DOCKET NO. CR-1347
APPLICANTS Ramesh Raskar, Somerville, MA; ** CONTINUING DATA ***** <i>NONE MSK</i> ** FOREIGN APPLICATIONS ***** <i>NONE MSK</i>				
IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 09/24/2001				
Foreign Priority claimed <input type="checkbox"/> yes <input checked="" type="checkbox"/> no 35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after met <i>allowance</i> Verified and <i>MSK</i> Acknowledged <i>MSK</i> Examiner's Signature Initials		STATE OR COUNTRY MA	SHEETS DRAWING 3	TOTAL CLAIMS 11
		INDEPENDENT CLAIMS 2		
ADDRESS Patent Department Mitsubishi Electric Research Laboratories, Inc. 201 Broadway Cambridge, MA 02139				
TITLE Multi-projector mosaic with automatic registration				
FILING FEE RECEIVED 854	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____	



Sheet 1 of 1

Form PTO-1449
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Patent and Trademark Office

Attorney Docket Number:

CR-1347

Serial Number:

INFORMATION DISCLOSURE CITATION

(Use several sheets if necessary)

Applicant:

Ramesh Raskar

Filing date:

Herewith

Group art area:

1017 U.S. PTO
09/930425

06/15/01

U.S. PATENT DOCUMENTS

Examiner Initial	Patent number	Date	Name	Class	Sub-class	Filing date if appropriate
MJK	5,986,668	11/16/99	Szeliski et al.	345	433	345/433

FOREIGN PATENT DOCUMENTS

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OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

MJK	Chen, "QuickTime VR - An Image-Based Approach to Virtual Environment Navigation"; Computer Graphics Proceedings, SIGGRAPH '95, pp. 29-38, 1995.
MJK	Szeliski et al. "Creating Full View Panoramic Image Mosaics and Environment Maps"; Computer Graphics Proceedings, SIGGRAPH '97, pp. 251-258, 1997.
MJK	Raskar et al., "Multi-Projector Displays Using Camera-Based Registration"; Proceedings of IEEE Visualization, pp. 161-168, 1999.
MJK	Chen et al., "Automatic Alignment of High-Resolution Multi-Projector Displays Using an Un-Calibrated Camera"; IEEE Visualization 2000, 2000.

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Date Considered:

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